DOCUMENT RESUME

ED 268 536 CS 209 656

AUTHOR Presseisen, Barbara Z.
TITLE Critical Thinking and Thinking Skills: State of the Art Definitions and Practice in Public Schools.
INSTITUTION Research for Better Schools, Inc., Philadelphia, Pa.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 20 Apr 86
NOTE 60p.; Paper presented at the Annual Meeting of the American Educational Research Association (70th, San Francisco, CA, April 16-20, 1986).
PUB TYPE Information Analyses (070) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Academic Achievement; *Cognitive Processes; *Critical Thinking; Educational Change; *Educational History; *Educational Improvement; *Educational Philosophy; Educational Practices; Educational Research; *Educational Trends; Elementary Secondary Education

ABSTRACT

Focusing on the revival of interest in teaching critical thinking as a major goal of schooling in American education, this paper examines why it has recurred, what is being emphasized, and, if there is significant change since the past occurrences, what has made that possible. Among the questions the paper addresses are: (1) what the renewed interest in critical thinking means to educators in elementary and secondary schools, (2) how critical thinking is being approached today compared to orientations advocated over the past 40 years, (3) how critical thinking compares to other kinds of thought processes also being emphasized in current efforts to improve school programs or to strengthen instruction of the nation's youth, and (4) what the results are--in terms of student achievement--of introducing critical thinking into the classroom. The paper concludes with an eight-page bibliography, a list of thinking skills meetings and conferences for 1984-1986, and a list of organizations in the Association for Supervision and Curriculum Development's Collaborative on Teaching Thinking. (HOD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SCOPE OF INTEREST NOTICE

The ERIC Facility has assigned this document for processing to:

In our judgment, this document is also of interest to the Clearinghouses noted to the right. Indexing should reflect their special points of view.

ED268536

CRITICAL THINKING AND THINKING SKILLS: STATE OF THE ART DEFINITIONS AND PRACTICE IN PUBLIC SCHOOLS

Barbara Z. Presseisen

Research for Better Schools, Inc.
444 North Third Street
Philadelphia, Pennsylvania 19123

April 20, 1986

A paper presented at the annual meeting, American Educational Research Association, San Francisco, CA.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Marian L. Chapman

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CS 209656

The work upon which this publication is based was funded by the Office of Educational Research and Improvement (OERI), U.S. Department of Education. The opinions expressed do not necessarily reflect the position or policy of OERI and no official endorsement should be inferred.

CRITICAL THINKING AND THINKING SKILLS: STATE OF THE ART DEFINITIONS AND PRACTICE IN PUBLIC SCHOOLS

INTRODUCTION

There is a revival of interest in teaching critical thinking as a major goal of schooling in American education. Like renewed periods of educational reform, it is useful to examine this interest to find out why it has recurred, what is being emphasized, and, if there is significant change since the past occurrences, what has made that possible? That is the major focus of this paper.

Of necessity, a study such as this is historical in nature. It wrestles with the question of impact over time. What does renewed interest in critical thinking mean to educators in elementary and secondary schools? How is critical thinking being approached today compared to orientations advocated over the past forty years? How does critical thinking compare to other kinds of thought processes also being emphasized in current efforts to improve school programs or to strengthen instruction of the nation's youth? What are the results -- in terms of student achievement -- of introducing critical thinking into the classroom? These are the issues that lie at the heart of a "state of the art" appraisal of the current critical thinking movement.

A study of the current movement to teach critical thinking also must be concerned with a large and rather diverse literature base. Writers long associated with the topic, such as Robert Ennis and Edward Glaser, have been contributing authors to the area for a number of years and have been joined by many additional researchers. Information on changing school

practice is another source of data for this study and may be more difficult to locate in the rush of an enthusiastic "movement." Nevertheless, information on what practitioners are doing, as well as conference proceedings or reports on state or association meetings, may be the most important resource for gauging impact or shedding light on the current state of affairs. Results of testing and testing programs also need to be examined. These various informational bases will be pursued in this study, insofar as they are currently available and described.

Finally, this is a study without a complete and exact end. By definition, a state of the art examination is descriptive of a given moment. At best, such a study presents what is and perhaps why; it may be able to speculate on what is likely to happen in the near future. But it remains to be seen, as more evidence is gathered and richer reflection takes place, whether the current movement will achieve ultimate success and raise critical thinking to the centerpiece of American schooling. Until research in depth occurs and powerful research questions are posed, one may only look back with a sense of déjà vu and realize that American schooling has been here before.

LOOKING BACK AT CRITICAL THINKING

Some would say critical thinking dates back to the golden age of ancient Greece or perhaps to the Enlightenment and its belief in human progress. But practically speaking, as a general goal of education for American society, the concept was introduced well into the twentieth century and was tied to particular documents or to the work of various individuals in several areas of educational pursuit.

Critical Thinking from 1938 to 1960

One of the first references to critical thinking as an important aspect of schooling came in the National Education Association (NEA) report, The Purposes of Education in American Democracy, issued in 1938 (Metcalf, DeBoer, & Kaulfers, 1966). Sponsored by the NEA's Education Policy Commission, the report reaffirmed the famous Cardinal Principles of Secondary Education which had been issued twenty years before. Both reports emphasized the need to help all students meet the demands of changing, democratic society. If "command of fundamental processes" was important, as the Cardinal Principles had suggested, one of the Commission's objectives, in terms of civic responsibility, included:

> Critical Judgment. The educated citizen has defenses against propaganda (Metcalf et al., 1966, p.146).

In a world enveloped in economic depression and standing on the threshold of war, critical thinking was part of a citizen's preparation to be loyal to democratic society as a whole, and not to be drawn into the sophisticated, political maneuverings of dictatorial powers.

In the years that followed, critical thinking was applied to situations influenced by bias and prejudice (Gage, 1940). But a more generalized goal

for education was the tone set by a number of other educational researchers. In 1942, H. E. Wilson called for students to use critical thinking in their decision making both at school and in extra-curricular activities beyond the classroom. His article was part of a yearbook of the National Council for the Social Studies which stressed critical thinking in the social studies curriculum (Wilson in Anderson, 1942, p.93). At about the same time, Edward Glaser (1941) called for the examination of evidence as a key aspect of critical thought:

> Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of evidence that supports it and the further conclusions to which it tends (p.6).

Glaser's work included his Watson-Glaser Critical Thinking Appraisal which sought to measure five aspects of the ability to think critically: inferences, assumptions, deductive reasoning, drawing conclusions, and evaluating arguments. The instrument was used in a number of studies during the 1940's and sought to determine if certain practices were helping high school students become critical thinkers (Howell, 1943). Critical thinking became an objective of the English curriculum and even of mathematics classes during this period (Gans, 1940; Murray, 1944).

By the 1950's, several projects devoted to critical thinking were established at various institutions of higher education. B. O. Smith directed a project at the University of Illinois and Robert Ennis headed a similar effort at Cornell University. The American Council on Education initiated the Cooperative Study of Evaluation in General Education and explored the application of critical thinking as a new goal for schooling. The study also examined the implications of thinking skill measurement and the need for further research (Dressel & Mayhew, 1954b). In seeking to

explain what critical thinking had to do with making an evaluation, D. H. Russell (1960) suggested in the Encyclopedia of Educational Research that:

> Critical thinking...is a process of evaluation or categorization in terms of some previously accepted standards. It is a logical examination of data which avoids fantasies and judgments on an emotional basis only (p.651).

This view of critical thinking was much more than a defense against propaganda. It involved reasoned judgment and seemingly was the basis of Smith's (1953) definition:

> Now if we set out to find out what...a statement means and to determine whether to accept or reject it, we would be engaged in thinking which, for lack of a better term, we shall call critical thinking (p.129).

Supposedly, it was also this approach that Ennis (1962) credited as the basis for his "root notion of critical thinking as the correct assessment of statements" (p.83). It was such an approach, too, that emphasized the rules of logic as the foundation for critical thinking decisions. Dewey's (1938) study of logic had appeared in the late 1930's; whether applied formally or informally, careful deliberation about the ways factual data interacted with the classic rules of reason was a major concern for many of the early researchers on critical thinking.

Critical Thinking from 1961 to 1980

In 1962, Robert Ennis (1962) published his famous Harvard Educational Review article on critical thinking. It probably was one of the most influential sources on the topic and sought to be both definitive and clear. Ennis pointed to the gaps that exist between philosophy and psychology's treatment of human thinking. In an era dominated by association theory, he called for "a comprehensive and detailed examination of what is involved in making judgments about the worth of statements or

answers to problems" (p.82). He focused on critical thinking as "the correct assessing of statements" (p.83). Ennis' study sought to elaborate the criteria used in making such assessments, to logically categorize such criteria, and to determine basic factors or dimensions of critical thinking.

Ennis (1962) proposed that there are twelve aspects of critical thinking:

1. Grasping the meaning of a statement.
2. Judging whether there is ambiguity in a line of reasoning.
3. Judging whether certain statements contradict each other.
4. Judging whether a conclusion follows necessarily.
5. Judging whether a statement is specific enough.
6. Judging whether a statement is actually the application of a certain principle.
7. Judging whether an observation statement is reliable.
8. Judging whether an inductive conclusion is warranted.
9. Judging whether the problem has been identified.
10. Judging whether something is an assumption.
11. Judging whether a definition is adequate.
12. Judging whether a statement made by an alleged authority is acceptable (p.84).

His list showed the importance of logical reasoning in the formation of critical thought. It suggested a number of standards, as Russell had proposed just two years earlier. Ennis purposely carved a particular approach. He excluded creative thinking, for example, not because he did not feel other kinds of thinking were also important; but because he sought to focus his attention on one important type of thinking. Many of his aspects were traceable to Dressel and Mayhew's (1954a) research of several years earlier.

Ennis (1962) further proposed that there were three basic analytically distinguishable dimensions of the proposed concept of critical thinking: a logical dimension, a criterial dimension, and a pragmatic dimension (p.84). The logical dimension covered judging relationships between meanings of words and statements. The criterial dimension elaborated the standards to

be met in determining certain judgments. The pragmatic dimension had to do with background purpose in making decisions about statements. It seems Ennis did not believe critical thinking occurred in a vacuum; he sought to elaborate the circumstances as well as the substance of critical thinking. He was wary that criteria should not be applied mechanically and he cautioned that researchers should develop a sense of the whole, which was one of the reasons he permitted considerable overlap in the list of twelve aspects. Insofar as determining where research could go with his conception of critical thinking, Ennis saw the possibility of using the aspects and criteria to develop tables of specifications for critical thinking tests, to study the influence of direct instruction of critical thinking in all three dimensions on student performance on other instruments, such as I.Q. tests; and to study relationships between critical thinking ability and particular personality characteristics. Ennis posed important questions relative to the developmental sequence of learning critical thinking in a school program:

- We need to learn at what age students of various types can efficiently master the various aspects and criteria...and the dimensions of critical thinking.
- We need to know in what curriculum patterns the aspects and/or dimensions are most effectively presented.
- What methods of teaching are most appropriate? Should the criteria of critical thinking be made explicit or left implicit? Do different groups need different approaches... (p.109)?

Ennis' further work involved the development of a second major test series on critical thinking, the Cornell Critical Thinking Tests, Level X and Level Z (Ennis, Millman & Tomko, 1985) which examines seven major areas of critical thinking: induction, deduction, value judgment, observation,

credibility, assumptions, and meaning. He also pursued research into the implementation issues raised in his seminal study. Ennis (1965) examined the readiness of adolescents to develop critical thinking ability. It is interesting to note that he found some of the early work of Bruner and his associates (Bruner, Goodnow & Austin, 1956) relatively related to his own critical thinking study; he was also cognizant of the importance of developmental and cognitive psychology to his overall research.

Following Ennis, the 1960's saw many extended applications of critical thinking to various school subjects and to classroom instruction. Fraser and West (1961) focused on the dispositional qualities of being a good critical thinker. An inquiring mind ought to be alert to the need to evaluate information, be willing to test opinions, and show a desire to consider all viewpoints, they said. Budmen (1967) cautioned teachers about teaching for the right answer alone; he suggested there are problems for which there are no single solutions but which require a step-by-step procedure to arrive at the best alternative. "More than anything else," he wrote, "students must understand that all behavior has consequences" (p.3). Numerous curricular areas considered whether their discipline could introduce critical thinking into the classroom (Devine, 1964; Rapparlie, 1964; Ballew, 1967). In some cases, new programs based on a particular approach to teaching critical thinking were developed in specialized subject areas (Massialas, 1963). One study involved college science courses comparing two approaches to teaching physical science, one using an experimental problem analyzing method versus a traditional lecture and recitation sequence (Rickert cited in D'Angelo, 1971). The American Council on Education's Test of Critical Thinking, was used to assess student results

and measure gains in critical thinking. This third test of critical thinking focused on five general abilities:

1. The ability to define a problem;
2. The ability to select pertinent information for the solution of a problem;
3. The ability to recognize stated and unstated assumptions;
4. The ability to formulate and select relevant and promising hypotheses; and
5. The ability to draw conclusions validly and to judge the validity of inferences (Dressel & Mayhew, 1954b, p.179).

The test data showed positive statistical improvement in critical thinking for the experimental group. The results were used to support the hypothesis that critical thinking can be improved with only one semester's instruction and systematic treatment of critical thinking.

Another approach to teaching critical thinking developed toward the end of the 1960's. This approach raised questions about cognitive development in general. Kurfman (1967) addressed the issue of research on topics like questioning-asking and hypothesis-formulating behaviors. He was concerned about how these actions influenced the teaching of social studies and, like Eisner (1971), he was interested in the overall curricular tasks of planning for thinking instruction in the classroom. Studies by Bruner (1960, 1966, 1967) and Taba (1964) were strong influences on instructional practice during this period and suggested there were both critical and creative dimensions to learning. The importance of intuition and the significance of non-linguistic bases to thinking were open questions being debated by researchers at this time. Some studies focused on cognitive processes that elaborate thought. Eisner (1965) examined critical thinking in terms of questioning, speculating, evaluating, and constructing -- obviously processes far beyond Ennis' initial approach to the topic.

In the 1970's, many new curricular programs were introduced and implemented in American schools. Several of them were discipline-oriented -- new math, new physics, new biology courses titled with now famous acronyms: SMSG, SCIS, BSCS. Some of the new programs emphasized critical thinking in particular. Lipman's (1976) Philosophy for Children was developed on the basis of presenting Harry Stottlemeier's Discovery to a group of fifth graders. An elementary school instructional text for teachers, Teaching for Thinking: Theory and Application (Raths, Wassermann, Jonas & Rothstein, 1967), gained fairly wide circulation. The book suggested using Watson-Glaser type assessment items to find out how students are progressing in their work. One of the authors had completed a doctoral dissertation on the topic, An Experiment in Developing Critical Thinking Through the Teaching of American History in the Secondary School. Ennis (1969) wrote a teacher-oriented volume on using logic in the classroom at this time. Another teacher-oriented text, Learning and Thinking (Hudgins, 1977), presented a chapter on the pupil as a critical thinker and reviewed research relevant to elementary and secondary instruction, drawing on both American and British sources. Even Kohlberg's (Kohlberg & Turiel, 1973) studies of moral development and Furth's (Furth & Wachs, 1974) application of Piaget to a school for thinking dealt with some of the same issues raised by critical thinking advocates, particularly the development of reasoning ability during middle and late childhood.

In Search of Definition

The initial period of critical thinking research in American schooling seems to have been an era in search of definition. By no means was it a period of common agreement. Allen and Rott (1969) suggest there were at

least three distinct approaches to the conception of critical thinking: critical thinking as an act of evaluation, critical thinking as an act of inquiry, and critical thinking as a pluralistic act. The narrower definition, critical thinking as primarily an evaluation act, was the dominant viewpoint of Ennis, Smith, and Russell and concentrated on understanding verbal assertions and the employment of logical principles in the use of language. Critical thinking as inquiry seems to have been more a concern of processes of decision making, formulating conclusions, and matching the student's behavior against some idealized sequence or procedure. The proactive dispositional qualities of a critical thinker came to focus in this approach, as well as the critical, doubting Thomas perspective of the defender of democracy, as reflected in Glaser's early writing. Budmen's emphasis of living with the consequences of one's choices was also part of this approach and, to some extent, even Ennis' pragmatic dimension seemed to be more an issue of the thinker's willingness and need to be critical rather than an aspect of his or her prime judgmental task. And the broadest approach of them all, the pluralistic or more all inclusive-type critical thinking, sought to justify both critical and creative or productive acts in the thinking process. How one responds to one's own generated ideas, how much more cognitive energy is incorporated into thinking and questioning acts were significant issues to Kurfman, Eisner, and the more developmental theorists like Kohlberg and Furth. They envisioned learners who were not only critical but knowing and productive as well, and they had different messages for the classroom instructor.

THE CURRENT INTEREST IN CRITICAL THINKING

It is difficult to trace the current movement to teach critical thinking to exact historic occurrences in the more recent past. Some of the current interest rests on the same notions that drove the initial period: concern for interpreting data accurately, the appreciation of clearcut, logical reasoning, the nature of evidence and the role of proof in reasoned argument. There were a number of historic developments and some parallel theoretical advances that influenced a rebirth of interest in critical thinking in the eighth decade of this century. It is useful to review these occurrences before examining the period itself.

Why the Renewed Interest in Critical Thinking?

The reform era in American education that lasted generally from 1983-1985 included numerous reports that criticized the schools for seemingly mediocre performance. In nearly every report, the fact that American students on the whole were poor thinkers, especially where "higher order cognitive processes" were concerned, was underlined (Presseisen, 1985b). By the same token, these reports often called for the need to teach thinking in some direct way or as a prerequisite of education in the 21st century:

> We must return to basics, but the 'basics' of the 21st century are not only reading, writing, and arithmetic. They include communication and higher problem-solving skills, and scientific and technological literacy -- the thinking tools that allow us to understand the technological world around us (National Science Board Commission, 1983, p.5).

The reasons for this position are numerous. Declining student performance on national tests like the Scholastic Aptitude Test (SAT) could not be explained away just because the statistics on those examinations seemed to improve. Stedman and Kaestle (1985) noted:

> All the talk about test score declines and getting back to basics tends to obscure the long-standing failure of U.S. schools to teach higher order skills and to reach the lower third of students (p.209).

The scores on the National Assessment of Educational Progress (NAEP) tests confirmed the problem of achievement in higher order processes for all but the top ten percent of American youth (Mullis, 1984). These results served to unsettle the nation and raise concern about the ability of future generations.

At the same time, American business became nervous about the economic challenge posed by Japan as a major industrial and technological power. Much as Sputnik I had threatened America's image of itself in the 1950's, Japan in the 1980's seemed all-too-able to outstrip both the nation's intellectual capacity and productive energy (Lohr, 1984; Ranbom, 1985). Japanese students enroll much more heavily in science and mathematics courses than do Americans, and seemingly, achieve greater success in their studies. Japanese adults score five times as well as Americans on genius ranges of standard intelligence tests (Harper's Index, 1984).

Combined with this global anxiety were the distractions of modern living that seem to play against strong academic achievement. Increased television watching precluded students' time for homework and reading activities. The dissolution of the American family through divorce, poverty, increased crime, and social stress added to the burden for parents as much as children, and may account for a good part of the test score decline. The changing demographics of American society seemed to indicate that a larger proportion of poor, ethnic minority children would soon be on the doorsteps of our schools and could be much more difficult to teach than former populations (Loyd, 1985; National Commission on Secondary Education

for Hispanics, 1984). The need to revamp schooling and renew good instruction seemed to be self-evident in the current period. At the same time, there were theoretical advances in various academic areas that created alternate views of both intelligence and instruction for schools bent on cognitive achievement.

Theoretical Advances in Understanding Intelligence and Instruction

In the period since the Second World War, there have been major developments in the study of cognitive and developmental psychology. Some see this as a major intellectual revolution (Gardner, 1985), and though it is not necessary to trace every step of that occurrence in this review, it is important to underline its significance in influencing a point of view that is positive with regard to the expectation that every person has the potential to become a better thinker, perhaps even an expert performer. In contrast to an era in which it was assumed one's intelligence was set by genetics and birth, there is a current school of thought that maintains intelligence is modifiable by experience and that one can influence change by the way learners are instructed and guided through experience (Whimbey & Whimbey, 1975; Sternberg, 1979; Lochhead, 1985). The most basic premise of the current thinking skills movement is the notion that students can learn to think better if schools concentrate on teaching them how to do so.

There is now a greater awareness, it seems, in understanding the student as a unique being with a long, gradual history in learning how to think. As Presseisen (1985a) suggests:

> Knowing is not something that can merely be tested on Friday, at the end of a unit, or at the conclusion of a convenient semester. Expertise develops gradually and is very much

> related to prior knowledge acquired and to the quality of experience in "playing with" that knowledge. So it is with thinking skills, and there is much to learn from comparing the growing proficiency of a novice performer to that of a more mature or successful learner (p.9).

The current movement is notable for its emphasis on both an extensive understanding of what are the processes of thought -- both essential and complex operations -- and its fascination with metacognition, the consciousness of one's own thought processes and their use (Flavell, 1976). Students in school learn content, the traditional subject matter of schooling, but it is what they become aware of in terms of what can be done with the information and how to do it that seems to have the greatest implications for learning in the long-term. Intelligence can be conceived as thinking and learning skills (Sternberg, 1981); and one can learn how to perform such acts better (Nickerson, Perkins & Smith, 1985). Thinking, says Costa (1986), is what one does when one does not know the answer to a problem. Referring to the importance of the learner's independence and control over his or her own thinking, some researchers suggest good thinking "involves not only knowing what one does and does not know, but also knowing what to do when one fails to comprehend" (Osborn, Jones & Stein, 1985, p.11). Students need to plan and monitor their own performance better.

Research from various fields has been brought to bear on this changing view of intelligence. Resnick (1976; 1985) elaborates on the findings of cognitive science and the growing understanding about expert learners. Brown (1985) develops instructional notions from the research base of computer technology and artificial intelligence. There are also ample studies from the work of instructional design specialists and specific subject matter researchers. The importance of metacognition in learning to

read and write has been discussed by Palincsar & Brown (1984), Brown (1985), and Scardamalia (1984). Using heuristics as a metacognitive technique in mathematical problem-solving has been stressed by Schoenfeld (1979, 1980, 1985). Similar work influencing the teaching of science has been proposed by Larkin (1980) and Lochhead (1981). In the long run, it is change in actual classroom experience that has been mandated by the new perspective. Thinking will be more effective in the classroom when students are actively engaged in the acts of thought, when youngsters have autonomy and control over their learning, and when they understand the problems they are working on. A constructivist philosophy seems to pervade instructional theory that is supportive of thinking in the classroom (Kamii, 1984), and the view of the instructor as the mediator of thought has been proposed as the appropriate model of instruction (Feuerstein, Jensen, Hoffman, & Rand, 1985). The teacher's primary task is to enable the youngster to think for him or herself and to construct an environment that is supportive of interactive, dynamic classroom exchange. Using various media and modalities, the essence of instruction is for the student to understand the meaning of the content and materials and to be able to work with that meaning in reconstructing new insights and learnings. The findings of effective schools research, in particular the emphasis on developing a positive climate conducive to learning and achieving clarity on academic goals (Purkey & Degen, 1985), seemingly pertain to this perspective as well.

In summary, the current interest in critical thinking revival and the background of a more general cognitive development movement seem to have grown out of some common roots. Thinking in general, as well as critical thinking in particular, is something that can be expected to be developed

in all youngsters. Indeed, in the anticipated needs of practicing democracy, it is a necessary development for the society to function at all. There is also some indication that better thinking can be developed by proper instruction and appropriate materials. The real challenge lies in how to organize the systems of education in the country and their human resources so as to be able to act on these principles and to deliver such an education.

Critical Thinking as Advocated in the Current Movement

Many educators currently advocate the teaching of critical thinking. What is meant by that rubric differs from one advocate to another. This study examines three major writers of the current period -- Edward Glaser, Richard Paul, and Robert Ennis -- because of their eminence in the movement and because of the ability to compare their present orientation with the historic period reviewed.

Some of the same arguments advanced in the initial phase of critical thinking are stressed in positions taken today. Glaser (1985) indicates that even some university-educated students "fail to carefully analyze important questions until all the implications are revealed" (p.25). He calls for a conscious and overt critical thinking program in elementary and secondary schools to guide students in this important critical act, and he reasserts his emphasis on making judgments upon the full use of available evidence. He sees this approach to critical thinking, much as he did forty years ago, as the essential task of responsible citizenship. Students have to become aware of their own contradictory statements, says Glaser, separate their wishes or biases from their interpretation of data, and become more cognizant of the use of information. Glaser (1985) maintains that critical thinking involves three principal elements:

1. an attitude of being disposed to consider in a thoughtful, perceptive manner the problems and subjects that come within the range of one's experiences;

2. knowledge of the methods of logical inquiry and reasoning; and

3. skill in applying those methods (p.25).

The emphasis on examination requires recognition of problems and pertinent factors, consideration of possible explanatory hypotheses, formulating means for dealing with the problems, and logically organizing pertinent information. Glaser sees critical thinking as closely allied to what he calls problem-solving behavior: the need to recognize unstated assumptions and values, understanding language and using it accurately, evaluating arguments and carefully appraising evidence, drawing inferences and testing them, and changing one's attitudes or revising judgments on the basis of persuasive evidence.

Glaser (1985) highlights some of the components he sees as key to the attitudinal attributes of a critical thinker: being disposed to listen to another person's point-of-view and seeking to understand it. He does not see creativity as a necessary aspect of critical thinking, but he does recognize that there are some influences on perception and thought that might influence the ways a thinker deals with a problem. He mentions intuition, broad-ranging, associative thinking, and non-verbalized forms of recognition; he suggests such behaviors require a different form of training which he considers beyond the scope of a critical thinking program.

Richard Paul (1984b) the California-based philosopher who heads the Center for Critical Thinking and Moral Critique, focuses his view of critical thinking on a distinction of two possible approaches to the area:

> ...a conception of these skills in a weak sense and in a strong sense. Conceived of in a weak sense, critical thinking skills are understood as a set of micro-logical skills ultimately extrinsic to the character of the person; [such] skills can get tacked onto other learning. In the strong sense, critical thinking skills are understood as a set of integrated macro-logical skills ultimately intrinsic to the character of the person and to the insight [he or she has on her/her] own cognitive and affective processes (p.5).

Paul opts for teaching critical thinking in the strong sense, a course he suggests will lead to both technical reason and emancipatory reason as a long-term goal for American schooling. It is a course that will enable thinkers to deal with problems at school but, more importantly, also with the messier problems of real life which, by and large, have been ignored by education.

The main focus of Paul's (1984b) approach is to develop two strategies for presenting critical thinking to public schools. A short-term strategy is built upon the weaker sense of understanding critical thinking. Teachers should develop the micro-logical, analytic critical thinking skills within traditional subject areas. They should build an appropriate vocabulary of related terms and perhaps attend a university level course in critical thinking, which will provide them "practice in the basic micro-logical skills associated with these terms" (p.6). They might use the Watson-Glaser Critical Thinking Appraisal or the Cornell Test of Critical Thinking in their assessment of students, and they might study and use some published programs in critical thinking like Philosophy for Children (Lipman, Sharp & Oscanyan, 1980) or Project IMPACT (Winocur, 1982). Paul further suggests that, in the short-term strategy, teachers and curriculum specialists should attend conferences and meetings on critical thinking and work on attitude development and program revitalization in their own schools. He

also proposes that educators interested in this area should establish a working relationship with a university critical thinking instructor, with whom they can have a meaningful exchange about the subject.

A preferred long-term strategy, according to Paul, should focus on two goals: the explication of obstacles to the development of critical thinking in the strong sense, and an increasing recognition of the distinctive nature and importance of dialectical issues and the ways they can be related to the traditional school curriculum. It is dialectical or dialogical reasoning which Paul (1985) asserts as the essence of critical thinking. To see things from others' points of view is the basis for becoming a more skilled thinker. That is the kind of thinking process that he advocates being translated into every domain of the school's program, not as a step-by-step procedure but as a more holistic spirit of rationality to be modeled in every classroom. Obstacles to such an approach, as indicated by Paul (1984b), include dealing with denying the need for such an approach, overcoming the technical blindness of cognitive psychology and the closed-minded fragmentation of technical domains, and helping students as young as possible value the authority of their own reasoning capacities. He focuses in on understanding the relationship of language to logic leading to the ability to analyze, criticize, and advocate ideas as the heart of such a critical thinking program. Paul directs a center which is striving to bring critical thinking "in the strong sense" to public educators as well as university personnel.

Robert Ennis (1985a) recently redefined his approach to critical thinking and applied the new definition both to a curriculum development

scheme and to his work in the assessment of student ability. His new definition states:

> Critical thinking is reflective and reasonable thinking that is focused on deciding what to believe or do (p.45).

Ennis sees his work providing a much more focused direction than the vague "higher-order thinking skill approach" (p.45), although he acknowledges that the current thinking skill perspective has inspired much more cognitive stuff to be incorporated into schooling. Ennis suggests Bloom's (1956) Taxonomy as a potential list of higher order skills. Then he rejects the taxonomy because it is "not accompanied by criteria for judging the outcome of the activity" (p.45). Ennis (1985a) presents his own scheme for a critical thinking/reasoning curriculum; it is summarized as follows (excerpted):

Critical thinking involves both dispositions and abilities:

A. DISPOSITIONS

1. Seek a clear statement of the thesis or question.
2. Seek reasons.
3. Try to be well-informed.
4. Use credible sources and mention them.
5. Take into account the total situation.
6. Try to remain relevant to the main point.
7. Keep in mind the original and/or basic concern.
8. Look for alternatives.
9. Be open-minded.
10. Take a position (and change a position) when the evidence and reasons are sufficient to do so.
11. Seek as much precision as the subject permits.
12. Deal in an orderly manner with the parts of a complex whole.
13. Be sensitive to the feelings, level of knowledge, and degree of sophistication of others.

B. ABILITIES

<u>Elementary Classification</u>

1. Focusing on a question
2. Analyzing arguments

3. Asking and answering questions of clarification and/or challenge

Basic Support
4. Judging the credibility of a source
5. Observing and judging observation reports

Inference
6. Deducing, and judging deductions
7. Inducing, and judging inductions
8. Making and judging value judgments

Advanced Clarification
9. Defining terms, and judging definitions
10. Identifying assumptions

Strategy and Tactics
11. Deciding on an action
12. Interacting with others (p.46).

Obviously, Ennis has greatly expanded his original, rather narrow definition. He also provides criteria in his current scheme to guide the carrying out of each activity and to suggest the parameters which are necessary for the action to be considered complete. Ennis has incorporated some creativity in his notion of critical thinking, but his major focus is how reasonable is the act, a judgment of thoroughness and adequacy. Furthermore, Ennis (1985b) is convinced that there are general principles of critical thinking that cut across many subject matters and which become the regular repertoire of a critical thinker. He illustrates this conviction with four examples:

1. A person's having a conflict of interest is a ground for regarding that person's claim with greater suspicion than would otherwise be appropriate.

2. It is a mistake to misdescribe a person's position, and then attack the position as if it actually were the person's position (the "strawperson" fallacy).

3. Given an "if-then" statement, denial of the consequent implies the denial of the antecedent.

4. The ability of a hypothesis to explain or help explain the facts leads support to the hypothesis, if the hypothesis is not otherwise disqualified (p.29).

The first three examples transfer well across subject matters, Ennis maintains. Perhaps they are less domain specific than the fourth. He acknowledges that knowledge about the content may be more significant to hypothesizing in a domain, but he also suggests we do not yet have clear criteria for telling whether we have taught for transfer. That leaves something to be worked on in the critical thinking movement. In terms of insights for teaching critical thinking, Ennis (1985b) provides guidelines for teachers drawn on many years of his own experience:

> Use many examples of many different sorts; go slowly; be receptive to questions and to students' original thoughts; press for clarity; arrange for students to engage each other in discussion and challenge; arrange for them to assume progressively greater control over and responsibility for their learning; encourage students to be aware of what they are doing and review what they have done; ask for a focus (often a thesis) and for reasons in any discussion, and encourage students to do likewise (p.30).

Ennis also considers how critical thinking can best impact American education. Adding courses at the university or college level is not problematical and can build on already-existing programs. The reverse is the case at the senior high school, and only where middle or junior high schools are flexible will there be change at that level. There can be no separate course for critical thinking in elementary schools, although those environments may be the most cordial in terms of accepting new ideas and the most able in communication skills. Ennis looks to curricular change as the hope for influencing the school's attention to critical thinking, and he seems to expect that English or social studies are the most receptive host subject matters. Not that there <u>are</u> particular subject matters that

must be related to critical thinking, he says, these are just the most likely candidates. From his Illinois Thinking Project on the Champaign campus, Ennis seeks to facilitate the implementation of his newly revised scheme.

How Thinking Has Been Received by Public Schools

Over the past two to three years, an unprecedented interest in improving students' thinking has been manifest in many aspects of American education. If one were to judge the real significance of this response, as opposed to a faddish interest which the nation has sometimes shown in the past, at least five areas can be examined: the general awareness exhibited in literature and conference activity, response in city and state school systems, organizational support, materials development, and teacher education and staff development. Each of these will be reviewed and summarized.

One can hardly pick up a professional journal without finding articles on thinking, critical thinking, or cognitive development as the focus of some discussion or examination (Bereiter, 1984; Beyer, 1984, 1985b; deBono, 1986; O'Reilly, 1985; Pogrow, 1985). Many major volumes of research or reports about research dealing with topics related to critical thinking and thinking skills instruction have also recently appeared (Gordon, 1985; Halpern, 1984; Nickerson, Perkins & Smith, 1985; Segal, Chipman & Glaser, 1985). What is interesting about this literature is that it is being read by university people and practitioners, by theoretically-oriented college professors — not only in the liberal arts — and by classroom teachers and administrators concerned with curriculum, instruction, testing, and staff development. In contrast to the early phase of critical thinking interest, the present period has a much more diverse educational population actually

involved in discussions about thinking and student achievement, and there seems to have been a long-term interest sparked by the material.

The conferences and meetings related to thinking skills and critical thinking over the past several years also represent an intensive interest in the topic and a similarly diverse audience. Some of the meetings have been one-time events, others represent annual occasions, and still others have been adjunct events to regular conferences. What is astounding is how many meetings there have been and how long the interest level has been sustained (see Appendix A - List of Thinking Skill Meetings and Conferences, 1984-1986). Speakers on various topics related to thinking and schooling have been the major presenters at these meetings, and representatives of published thinking programs and related materials, like test producers, have been busy exhibiting their wares. In addition, demonstrations by local school personnel of programs in development or staff in-service models have also been presented and discussed.

The response to the current movement at the local district level or in state education offices has also been noteworthy over the past two to three years. Walsh and Paul (1985) report a 50-state survey conducted by the American Federation of Teachers that indicates "a range of initiatives on the issue from no activity, to legislation mandating the teaching of critical thinking skills (California, South Carolina, Wisconsin, Connecticut, New York, Texas), to state level recommendations, conferences, newsletters and teachers guides" (pp.16-17). Some states (Alaska, Maryland, Vermont) are encouraging program development at the local level and relating the thinking processes to regular content areas. Other states (Pennsylvania, North Carolina, Michigan, Connecticut) are relating the teaching

of critical thinking or thinking skills to their state assessment programs and use the results of state testing to determine remediation or instructional improvement efforts. Various individual school districts have developed their own programs for improving the teaching of thinking and related these programs to their ongoing staff development efforts (Baltimore, MD; Montgomery County Public Schools, MD; Springfield Township, PA; Pittsburgh, PA). The New Jersey Test of Reasoning Skills (Shipman, 1983), was developed as a collaborative project among the New Jersey Department of Education, the Totowa (NJ) Board of Education, and Educational Testing Service (Morante & Ulesky, 1984). A state task force which included Matthew Lipman, who developed the Philosophy for Children program, was active in formulating the plans for the test. Similarly, a collaborative effort between the Connecticut Department of Education and the Psychological Corporation on the development of a statewide mastery test, grade 4, which includes the assessment of thinking as related to Sternberg and Ennis' work, is now underway (Sternberg & Baron, 1985). Some districts have planned their own scope and sequence or curricular program and have had their local staff members develop exemplary units of instruction to be shared with the rest of the district (Baltimore, MD, Shoreham-Wading, NY). Interest at the grass roots level requires support in the central office and long-term planning to achieve real institutionalization. Often that type of an effort calls for resources and guidance from larger support systems. It is interesting to note that in this phase of the critical thinking and thinking skills movement, the work of several professional organizations has been very influential.

29

The role of the Association for Supervision and Curriculum Development (ASCD) and several other national organizations has been noted for encouraging the teaching of thinking over the past two years. From sponsoring a national meeting at Wingspread in May, 1984, to publishing Developing Minds: A Resource Book for Teaching Thinking (Costa, 1985), ASCD has been in the forefront of encouraging educators to do more than just talk about implementing a thinking skills program. Numerous articles have appeared in Educational Leadership, the organization's periodical; a network of interested practitioners was initiated in 1985, and several curriculum study institutes have been offered to school personnel at various sites throughout the country. Early in 1986, a collaborative group of 23 national organizations was formed to encourage the development of a thinking perspective among the affiliated groups (see Appendix B - Organizations in ASCD's Collaborative on Teaching Thinking). Interestingly, two of the collaborative members, the American Federation of Teachers and the National Education Association, have instituted their own training programs for their members in critical thinking skills (Walsh & Paul, 1985; Heiman & Slomianko, 1985). In addition, the American Association of School Administrators and Phi Delta Kappa have also developed training seminars for their members interested in learning about teaching thinking or critical thinking.

Most of what occurs at conferences or state meetings and the topics of many district activities revolve around the published programs that have appeared to teach thinking or critical thinking. Unlike the earlier period of critical thinking interest, there is no paucity of published materials now -- in fact, there is a great diversity of supply. It is beyond the scope of this paper to describe the numerous programs now available for

purchase for teaching thinking or critical thinking, but a summary description is in order.* Programs differ in terms of the audience they address; few programs are appropriate for an entire K-12 population. Some programs deal specifically with critical thinking like Philosophy for Children or Project IMPACT. Other programs are based on psychological processes or theory like Feuerstein's Instrumental Enrichment or Innovative Science's Strategic Reasoning. Some programs stress the more creative processes like CoRT or Productive Thinking. Many programs are available with teacher training components; some can be used only when the training of staff is also purchased as a prerequisite of program adoption. Few programs have fully developed testing packages to accompany their materials, but some may refer their goals to similar objectives on a Watson-Glaser or the Cornell Test of Critical Thinking or to a standardized assessment battery like the California Achievement Tests. In general, a great variety of program materials exist and, to some extent, have been adopted by public schools very much as any new curricular materials are acquired. Some districts, however, have used selected programs as pilot tests of thinking skill approaches and sought information about how their students and teachers worked with the material in the context of a larger staff development effort. Baltimore City Public Schools has been one of these districts and their activity in developing a district-wide thinking program has included intensive staff orientation and curriculum planning, as well.

Finally, the availability of teacher education programs about critical thinking and thinking skill development should be examined. Interest on

---

*See Part VIII in A. Costa (Ed.), Developing Minds for a catalogue of the most frequently cited programs.

university campuses is growing, but to some extent, is not as developed as the interest in elementary and secondary institutions. California, with its mandated critical thinking requirement across all levels of schooling, probably has one of the most extensive programs that reaches down to the mentor teacher activities at the local school level. The intermediate service agencies' training in Pennsylvania provides leadership in that state and the University of Michigan has forged a program with regard to testing and thinking skill development. Harvard University has developed a summer training institute and the University of Massachusetts has begun a Critical and Creative Thinking Program at its Boston campus. Boise State University in Idaho similarly has established a Center for the Study of Thinking. It remains to be seen if these efforts will actually influence degree granting practices or teacher certification standards, but interest in course work and the need to understand the literature and research upon which the current movement is based is already a fact in existence. If the current movement continues, one would expect demand for training new teachers in the content of critical thinking and thinking skills to be sustained if not increased.

State-of-the-Art: Focus for the Moment

What does the examination of the current interest in critical thinking in public schooling reveal at this point in time? First, the examination shows there are several different theoretical perspectives that historically have met in the current movement in American education. Sternberg (1985) identifies three: the philosophical, the psychological, and the educational. He emphasizes that all three perspectives can learn from each other and he implies that their common interest in helping students become good thinkers

already reveals a substantial overlap of viewpoints. How students learn, how they comprehend complex information and develop deductive or inductive reasoning skills are significant to all three perspectives. But, as a second consideration, there are some divergent or controversial positions made evident by this examination, and they may require some discussion or further understanding based on the description of the current period. Finally, issues that ought to be explored in further research need to be explicated and the questions to guide that inquiry at least suggested.

One of the most striking aspects of the agreement of both critical thinking theorists (the philosophers) and the thinking skill advocates (the psychologists) is the emphasis on the learner's self-concept as a thinker and the attendant awareness about what it is like to think through a task or problem. Whether one is talking about developing metacognitive skills or nuturing dispositions to be a good critical thinker, the concern is relatively the same and may explain much of what the current movement has found to be common ground among critical thinking, thinking skill development, and education. What is more a source of disagreement is what does one think about? Sternberg (1985) stresses that philosophers focus their attention on the requirements of formal logic systems and the significance of language analysis to such systems. It is not surprising, then, that he found that philosophically based tests of thinking -- the Watson-Glaser, the Cornell Test or Critical Thinking and the New Jersey Test of Reasoning Skills "measure reasoning in [a] verbal context...[and that] the distinguishability of their test scores from verbal intelligence is marginal (p.59). The question then arises, what else might higher order thinking involve? Some other aspects of controversy in the current period suggests answers to this query.

In his discussion of his newly-defined scheme of critical thinking dispositions and abilities, Ennis (1985a) suggests that the concept "higher-order thinking skills" is too vague a term to be useful as a guide for development of teaching, curricula, and evaluation procedures. Similarly, Paul (1984b) proposes that cognitive psychology has been technically biased in its views of thinking and its development. Both critical thinking writers discuss Bloom, whose taxonomy is analyzed as a suggested list of cognitive behaviors, but neither really analyze the work of recent cognitive theorists to compare the skills they suggest to the desired critical thinking scheme. For instance, Sternberg's (1985) triarchic model could be reviewed or Resnick's (1985) recent research into the nature of higher order thinking could be discussed:

- Higher order thinking is non-algorithmic. That is, the path of action is not fully specified in advance.
- Higher order thinking tends to be complex. The total path is not "visible" (mentally speaking) from any single vantage point.
- Higher order thinking often yields multiple solutions, each with costs and benefits, rather than unique solutions.
- Higher order thinking involves nuanced judgment and interpretation.
- Higher order thinking involves the application of multiple criteria, which sometimes conflict with one another.
- Higher order thinking often involves uncertainty. Not everything is known that bears on the task at hand.
- Higher order thinking means self-regulation of the thinking process. We do not recognize higher order thinking in an individual when someone else "calls the plays" at every step.
- Higher order thinking involves imposing meaning, finding structure in apparent disorder (p.10).

When dealing with complex thinking, we do not necessarily know everything there is to be known about the subject. Psychologists suggest there is room for insight (Sternberg, 1985), intuitive learning (Sadler & Whimbey, 1985), even creativity (deBono, 1984, 1986) in the learning process, and Resnick (1985) suggests it may be these qualities that make certain contents learnable or transferable, while posing other problems for instruction. DeBono (1984) proposes that critical thinking is reactive, a "second-stage servicing system." Where creative thinking is concerned, he says, we need to open new ways to deal with perceptions, with the inventiveness and the playfulness that are part of the most basic human intellectual function. To a large extent, the critical thinking theorists avoid this task; Glaser (1985) says such thinking is beyond the scope of his program. Is it also beyond the scope of children's education for better thinking? Some writers like Olson (1973, 1976a, 1976b, 1985) suggest that changing technology and shifting modalities require us to prepare youngsters for more than the verbal art form in a global culture. New and different skills may be required for citizens who are to function most of their lives in the 21st century. In applying critical thinking in the literature classroom of a secondary school, some practitioners (Barell, 1983) have found the blend of language and art, much as Eisner envisioned it in the early critical thinking period, is most effective for learning.

There is controversy about how one should approach critical thinking in the classroom, too. Paul (1984b) questions whether Beyer's direct instruction approach is not too procedural in nature -- rhetorical and not dialectical, superficial in the "weak sense." Paul wants to work from principles not procedures. At the base of this discussion is the question

of how do students learn at all, or, in fact, do they learn differently at different times? One is reminded of the questions Ennis (1962) raised in his Harvard Educational Review study. How does reasoning develop in school-aged children? Ennis (1976) rejected Piaget's model of competency, but did he also reject the epistimologist's scheme of accommodation? Does the youngster hold onto his or her original explanations until new experiences convince him or her to abandon them in favor of better evidence? Piaget (1970) spent a lifetime developing a theory around such a model of cognition. Beyer (1985a, 1985b) proposes his direct instructional model as a way for teachers to focus on particular skills in exact ways, and as a means for "overlearning" in the sense that awareness can transfer from one experience and content to another. What is more significant, he suggests, is how the student metacognitively reports on his or her experience with a particular skill, and how well the teacher becomes aware of and gains insight into a particular student's developing ability.

In sum, looking at the current interest in critical thinking leads one to conclude that the common interests of critical thinking advocates and those who would advance thinking skills represent a tentative alliance. Critical thinking theorists have moved dramatically from their earlier positions and have joined forces with the cognitivists in supporting the importance of youngsters developing a disposition to think with discrimination. They have accepted, too, the argument that such a disposition needs to be nurtured as early as possible in formal schooling, and that teachers and the school program are key to such improvement. There is some uneasiness about exactly what skills one advocates and how that should be done, but even encouraging thinking in the weak sense, according to Paul (1984),

is a step in the right direction. The activities that he envisions in that initial strategy have pretty well been accomplished according to the responses made to the goal of critical thinking by practitioners, association leaders, university personnel, publishers, and, to some extent, teacher educators. The question now, it would seem, is how do you turn the short-term into the long-term? How do you transform the frog into a prince, Cuban (1984) would ask. That seems to be the challenge to the current movement to make critical thinking the goal of American education.

ISSUES FOR THE FUTURE

There are a number of questions and issues suggested by the current movement to teach thinking in America's schools. If there are three perspectives caught up in this movement, these questions and issues might become the substance of a trialogue among the concerned, interested parties. They are topics, it would seem, that need to be resolved in order to help the movement progress. The questions are:

- What are the definitions of higher order or critical thinking skills which schools can teach?
- What do students need to be able to do to show they have mastered such skills?
- How is the teaching of thinking to be coordinated with the school's curriculum?
- How is the teaching of thinking most effectively implemented in instruction?
- What policy recommendations are necessary to insure the institutionalization of the teaching of thinking?

What Do We Need to Know?

The current movement suggests there is substantial agreement on some skills as basic to all higher order processing. Quellmalz (1985) suggests at least four major cognitive processes: to analyze, compare, infer/interpret, and evaluate (p.30). Are these sufficient or are there others that need to be considered? Beyer (1985a) proposes that problem solving is not critical thinking; then what is problem solving and how does it differ and why? To develop a strong thinking skills program, educators need careful definitions. These need not be simplistic, but they should be clear. From such a framework of meaning can come a sound program design.

There is a strong assessment need in advocating any new educational goal. Particularly since the critical reports of the 1983-85 period, the need to be able to show that students are progressing in their work seems to be required by the powers that be. Without succumbing to a no-win situation without a fight, the need to improve our assessment of thinking performance seems obvious, and is based, it would seem, on the clearer understandings of what we mean by better thinking. There are few tests of metacognitive abilities; there are limited testing examples of particular skills in the content areas. These are the directions that school personnel and testing agencies can work on together. Inherent in the task would be some resolution about the development of thinking as youngsters progress through thirteen years of education, and some understanding about the range of individual differences and manifestation of special abilities.

Serious question needs to be raised, too, about how to organize the school's curriculum to best address the teaching of thinking. The question of a separate course versus integrated thinking throughout the school's program may need to be discussed for a variety of reasons. On the pragmatic side, few innovations have altered the school's program for more than a hundred years (Cuban, 1982). Some theorists (McPeck, 1981) argue that it is only in the content areas that thinking can be taught, and whether that is so or not, content teachers <u>are</u> the primary route of entry of most new curricular developments. There is no certification for teaching thinking; until there might be, the subject matter specialist needs to wrangle with the questions of how to relate teaching thinking to ongoing classroom activity. Whether a published program is the answer to any particular school's needs depends on what the particular students ought to work on,

what kinds of resources a district has available, and the expectations its leadership has for student performance at any designated time, like graduation.

Perhaps the most serious issue facing America's schools regarding the teaching of thinking is what do we expect to change in the classroom? It is in the exchange between teachers and students, and among students, that critical thinking or thinking skill development should alter relationships. Does the teacher pose more challenging questions? Does the student? Does the student suspend judgment or seek further evidence? Do both teachers and students value others' opinions or points of view? How active is the instructor in translating the speciality of his or her content expertise into a form of instruction that has meaning to the student and also enhances the student's thought process in that subject matter? Shulman (1986) suggests this is the major blind spot in current teaching that needs the most urgent remediation in American schools. It is probably this topic that needs the most careful consideration regarding staff in-service or pre-service teacher education in the years ahead.

Lastly, questions of policy face the critical thinking/thinking skill movement as a whole. Faced with projected teacher shortages in the near future, where are the teachers of thinking to be found? If we are going to retrain current staff, where are the funds and the trainers to come from? How are districts supposed to know if programs have been effectively designed and implemented? How are we to determine if the needs of changing populations are being met? The renewed interest in critical thinking development opens a Pandora's box of queries that require answering before we are even ready to launch thinking development in a strong sense. It

also underlines the need for sound research data concerning the answers to these questions.

The Need for Further Research

If the current movement to teach critical thinking and thinking skill development can be faulted in any way, it is with regard to not generating sufficient research data to uphold its convictions. While there is generally sound information on the fact that much of America's student population cannot consistently think critically about problems on tests (Norris, 1985), we are less informed on how well they are performing after instruction in critical thinking or in the course of a thinking skill program. There are glimmers of hope, even some indicators that progress might be made on tests like the SAT (Worsham & Austin, 1983), but not large scale studies. They are needed.

It would be useful to revisit the questions Ennis (1962) raised in his major study of critical thinking in terms of the research agenda we could set today. What do we know about when and how children learn the various thinking skills that are deemed important? Even if a list of skills were carefully defined and agreed upon by psychologists, philosophers and educators -- something like Gubbins' Matrix noted by Sternberg (1985, p.52) -- do we know how and when these are efficiently mastered by various school populations? This is an area of research now underway (Chi & Rees, 1983); these researchers need to join our trialogue. The questions raised by curriculum developers and subject matter specialists also need further research. What does the experience of presenting critical thinking in a subject matter tell us about implementing thinking in school programs? Documenting these experiences, because they are extensive, is costly for

school districts and relatively rare. Pittsburgh's program to infuse critical thinking into the social studies curriculum (Cornbleth, 1985; Moss & Petrosky, 1983) may serve as a model for this work. It is needed in every curricular area. Finding out if and how well published programs served the needs of learners is another area of research that is sorely lacking. Information from the extensive use of programs like Instrumental Enrichment and Philosophy for Children should be sought. Brainen (1985) indicates that research on Feuerstein's work is important for pedagogical decisions in teaching low achievers; she also suggests that insights into teacher behavior and preparation can be drawn from such studies.

In sum, research on critical thinking and thinking skill development corroborates the intuitions that many educators have about the soundness of teaching for cognitive improvement. However, there are numerous topics that are ripe for research to determine if, in fact, our hunches are accurate. As Dewey might have noted, there is a "felt need" in the educational community; there is still a great deal of hard thinking that needs to be applied to the realities faced by the current movement. That is the bridge to be crossed to critical thinking in the strong sense.

IN CONCLUSION

This study has reviewed the current revived interest in teaching critical thinking in terms of its historic roots and with respect to current conditions. Seemingly, a unique historic situation has been identified and at least three perspectives of the period noted. Critical thinking advocates, drawn mainly from a philosophical position, have tentatively allied with cognitive psychologists and practitioner-school personnel who all want to improve the intellectual functioning of American students. Can they find a common viewpoint that can make possible the goal of enabling all youngsters to develop their full potential as thinkers and citizens? The challenge for long-term change, as applicable to solving life's problems as well as school tasks, needs further research and understanding. It is not a quick-fix movement. The finale is yet to be written.

REFERENCES

Allen, R. R., & Rott, R. K. (1969). The nature of critical thinking (Theoretical Paper No. 20). Madison, WI: Wisconsin Research and Development Center for Cognitive Learning.

Anderson, H. R. (Ed.). (1942). Teaching critical thinking in the social studies (thirteenth yearbook). Washington, DC: National Council for the Social Studies.

Ballew, H. (1967). Discovery learning and critical thinking in algebra. High School Journal, 50, 261-270.

Barell, J. (1983). Reflections on critical thinking in secondary schools. Educational Leadership, 40(6), 45-49.

Benderson, A. (1984). Focus 15. Princeton, NJ: Educational Testing Service.

Bereiter, C. (1984). How to keep thinking skills from going the way of all frills. Educational Leadership, 42(1), 75-77.

Beyer, B. K. (1984). What's in a skill? Defining the thinking skills we teach. Social Science Review, 24(1), 19-23.

Beyer, B. K. (1985a). Critical thinking: What is it? Social Education, 49(4), 270-276.

Beyer, B. K. (1985b). Teaching critical thinking: A direct approach. Social Education, 49(4), 297-302.

Beyer, B. K. (1985c). Teaching thinking skills: How the principal can know they are being taught. NASSP Bulletin, 69(477), 70-83.

Bloom, B. S. (Ed.). (1956). Taxonomy of educational objectives: Handbook I: Cognitive domain. New York: David McKay.

Brainen, S. S. (1985). Mediating learning: Pedagogic issues in the improvement of cognitive functioning. In E. W. Gordon (Ed.), Review of research in education (volume 12) (pp. 121-155). Washington, DC: American Educational Research Association.

Bruner, J. S. (1960). The process of education. New York: Vintage Books.

Bruner, J. S. (1966). Toward a theory of instruction. Cambridge, MA: The Belknap Press.

Bruner, J. S. (1967). On knowing: Essays for the left hand. New York: Atheneum.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. (1956). A study of thinking. New York: John Wiley.

Budmen, K. O. (1967). What do you think, teacher? Peabody Journal of Education, 45(1), 2-5.

Brown, A. L. (1985). Teaching students to think as they read: Implications for curriculum reform. Paper prepared for the American Educational Research Association Project: Research Contributions for Educational Improvement.

Brown, J. S. (1985). Idea amplifiers - new kinds of electronic learning environments. Educational Horizons, 63(3), 108-112.

Chi, M. T. H., & Rees, E. T. (1983). A learning framework for development. Pittsburgh, PA: Learning Research and Development Center.

Cornbleth, C. (1985). Critical thinking and cognitive process. In W. B. Stanley, C. Cornbleth, R. K. Jantz, K. Klawitter, J. S. Leming, J. L. Nelson, J. P. Shaver, & J. L. White, Review of research in social studies education 1976-1983, Bulletin 75 (pp, 11-63). Boulder, CO: ERIC Clearinghouse for Social Studies/Social Science Education.

Costa, A. L. (Ed.). (1985). Developing minds: A resource book for teaching thinking. Alexandria, VA: Association for Supervision and Curriculum Development.

Costa, A. L. (1986). Teaching skillful thinking (A videotape series, Part 1). Alexandria, VA: Association for Supervision and Curriculum Development.

Cuban, L. (1982). Persistent instruction: The high school classroom, 1900-1980. Phi Delta Kappan, 64(2), 113-118.

Cuban, L. (1984). Transforming the frog into a prince: Effective schools research, policy, and practice at the district level. Harvard Educational Review, 54(2), 129-151.

D'Angelo, E. (1971). The teaching of critical thinking. Amsterdam: B. R. Gruner.

deBono, E. (1984). Critical thinking is not enough. Educational Leadership, 42(1), 16-17.

deBono, E. (1986). Beyond critical thinking. Curriculum Review, 25(3), 12-16.

Devine, T. G. (1964). Can we teach critical thinking? Elementary English, 41(2), 154-155.

Dewey, J. (1938). Logic: The theory of inquiry. New York: Holt, Rinehart & Winston.

Dressel, P. L., & Mayhew, L. B. (1954a). Critical thinking in social science: A handbook for evaluation and teaching. Dubuque, IA: William C. Brown.

Dressell, P. L., & Mayhew, L. B. (1954b). General education: Explorations in evaluation. Washington: American Council on Education.

Eisner, E. W. (1965). Critical thinking: Some cognitive components. Teachers College Record, 66(7), 624-634.

Eisner, E. W. (Ed.) (1971). Persistent dilemmas in curriculum decision-making. In E. W. Eisner (Ed.), Confronting curriculum reform (pp. 162-173). Boston: Little Brown.

Ennis, R. H. (1962). A concept of critical thinking. Harvard Educational Review, 32(1), 81-111.

Ennis, R. H. (1965). Critical thinking readiness in grades 1-12: Phase I. Deductive reasoning in adolescence (Project No. 1680). Ithaca, NY: Cornell University, School of Education.

Ennis, R. H. (1969). Logic in teaching. Englewood Cliffs, NJ: Prentice-Hall.

Ennis, R. H. (1976). An alternative to Piaget's conceptualization of logical competence. Child Development, 47(4), 903-919.

Ennis, R. H. (1985a). A logical basis for measuring critical thinking skills. Educational Leadership, 43(2), 44-48.

Ennis, R. H. (1985b). Critical thinking and the curriculum. National Forum, 65(1), 28-31.

Ennis, R. H., Millman, J., & Tomko, T. N. (1985). Cornell critical thinking tests: Level X and Level Z-manual (Third edition). Pacific Grove, CA: Midwest Publications.

Feuerstein, R., Jensen, M. R., Hoffman, M. B., & Rand, Y. (1985). Instrumental enrichment, an intervention program for structural cognitive modifiability: Theory and practice. In J. W. Segal, S. F. Chipman, & R. Glaser (Eds.), Thinking and learning skills, Vol. 1. Hillsdale, NJ: Lawrence Erlbaum Associates.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), The nature of intelligence. Hillsdale, NJ: Lawrence Erlbaum Associates.

Fraser, D. M., & West, E. (1961). Social studies in secondary schools. New York: Ronald Press.

Furth, H. G., & Wachs, H. (1974). Thinking goes to school: Piaget's theory in practice. New York: Oxford University Press.

Gage, F. A. (1940). A unit on propaganda analysis. Social Education, 6(7), 483-488.

Gans, R. (1940). Critical reading comprehension in the intermediate grades. New York: Teachers College, Columbia University, Bureau of Publications.

Gardner, H. (1985). A history of the cognitive revolution. New York: Basic Books.

Glaser, E. M. (1941). An experiment in the development of critical thinking. New York: Teachers College, Columbia University, Bureau of Publications.

Glaser, E. M. (1985). Critical thinking: Educating for responsible citizenship in a democracy. National Forum, 65(1), 24-27.

Gordon, E. W. (Ed.). (1985). Review of educational research (Volume 12). Washington, DC: American Educational Research Association.

Halpern, D. F. (1984). Thought and knowledge: An introduction to critical thinking. Hillsdale, NJ: Lawrence Erlbaum Associates.

Harper's Index. (1984). Harper's Magazine, 268(1608), 9.

Heiman, M., & Slomianko, J. (1985). Critical thinking skills. Washington, DC: National Education Association.

Howell, W. S. (1943). The effects of high school debating on critical thinking. Speech Monographs, 10, 96-103.

Hudgins, B. B. (1977). Learning and thinking: A primer for teachers. Itasca, IL: F. E. Peacock.

Kamii, C. (1984). Autonomy: The aim of education envisioned by Piaget. Phi Delta Kappan, 65(6), 410-415.

Kohlberg, L., & Turiel, E. (Eds.). (1973). Recent research in moral development. New York: Holt, Rinehart & Winston.

Kurfman, D. (1967). The evaluation of effective thinking. In J. Fair & F. R. Shaftel (Eds.), Effective thinking in the social studies (37th yearbook) (pp. 231-253). Washington, DC: National Council for the Social Studies.

Larkin, J. H. (1980). Teaching problem solving in physics: The psychological laboratory and the practical classroom. In D. T. Tuma & F. Reif (Eds.), Problem solving and education: Issues in teaching and research (pp. 111-115). Hillsdale, NJ: Lawrence Erlbaum Associates.

Lipman, M. (1976). Philosophy for children. Metaphilosophy, 7(37).

Lipman, M., Sharp, A. M., & Oscanyan, F. S. (1980). Philosophy in the classroom. Philadelphia: Temple University Press.

Lochhead, J. (1981). Research synthesis on problem solving. Educational Leadership, 39(1), 68-70.

Lochhead, J. (1985). Introduction to Section 1 - New horizons in educational development. In E. W. Gordon (Ed.), Review of research in education (Vol. 12) (pp. 3-9). Washington, DC: American Educational Research Association.

Lohr, S. (1984, July 8). The Japanese challenge. New York Times Magazine, 18-23, 37, 39, 41.

Loyd, L. (1986, February 13). The students of tomorrow will be harder to teach, educators are told. The Philadelphia Inquirer, 8-B.

McPeck, J. E. (1981). Critical thinking and education. Oxford, England: Martin Robertson.

Massialas, B. G. (1963). Developing a method of inquiry in teaching world history. In B. G. Massialas (Ed.), The Indiana experiments in inquiry: Social studies. Indiana University, Bulletin of the School of Education, 39, 1-35.

Metcalf, L. E., DeBoer, J. J., & Kaulfers, W. V. (Eds.). (1966). Secondary education: A textbook of readings (pp. 123-146). Boston: Allyn & Bacon.

Morante, E. A., & Ulesky, A. (1984). Assessment of reasoning abilities. Educational Leadership, 42(1), 71-74.

Moss, P. A., & Petrosky, A. R. (1983). A proposal for measuring critical thinking. Pittsburgh, PA: Board of Public Education. (ERIC Document Reproduction Service No. ED 237 399)

Mullis, I. V. S. (1984, May). What do NAEP results tell us about students' higher order thinking abilities? Racine, WI: Association for Supervision and Curriculum Development Conference at Wingspread (photocopy).

Murray, E. (1944). Conflicting assumptions. The Mathematics Teacher, 37(2), 57-63.

National Commission on Secondary Education for Hispanics. (1984). Make something happen: Hispanics and urban high school reform (Volumes I and II). Washington, DC: Hispanic Policy Development Project.

National Science Board Commission. (1983). Educating Americans for the 21st century: A plan for action improving mathematics, science and technology education for all American elementary and secondary students so that their achievement is the best in the world by 1995. Washington, DC: National Science Board Commission on Precollegiate Education in Mathematics, Science and Technology, National Science Foundation.

Nickerson, R. S., Perkins, D. N., & Smith, E. E. (1985). The teaching of thinking. Hillsdale, NJ: Lawrence Erlbaum Associates.

Norris, S. P. (1985). Synthesis of research on critical thinking. Educational Leadership, 42(8), 40-45.

Olson, D. R. (1973). What is worth knowing and what can be taught. School Review, 82(11), 27-43.

Olson, D. R. (1976a). Culture, technology, and intellect. In L. B. Resnick (Ed.), The nature of intelligence (pp. 189-202). Hillsdale, NJ: Lawrence Erlbaum Associates.

Olson, D. R. (1976b). Notes on a cognitive theory of instruction. In D. Klahr (Ed.), Cognition and instruction. Hillsdale, NJ: Lawrence Erlbaum Associates.

Olson, D. R. (1985). Computers as tools of the intellect. Educational Researcher, 14(5), 5-7.

O'Reilly, K. (1985). Teaching critical thinking in high school U.S. history. Social Education, 49(4), 281-283.

Osborn, J. H., Jones, B. F., & Stein, M. (1985). The case for improving textbooks. Educational Leadership, 42(7), 9-16.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. Cognition and Instruction, 1, 117-175.

Paul, R. (1984a). The concept of critical thinking: An analysis, a global strategy, a plea for emancipatory reason. Racine, WI: Association for Supervision and Curriculum Development Conference at Wingspread (photocopy).

Paul, R. (1984b). Critical thinking: Fundamental to education for a free society. Educational Leadership, 42(1), 4-14.

Paul, R. W. (1985). The critical thinking movement: A historical perspective. National Forum, 65(1), 2-3, 32.

Piaget, J. (1970). In P. H. Mussen (Ed.), Piaget's theory in Carmichael's manual of child psychology (Vol. 1) (pp. 703-732). New York: John Wiley.

Pogrow, S. (1985). Helping students to become thinkers. Electonic Learning, 4(7), 26-29.

Presseisen, B. Z. (1985a). Thinking skills throughout the curriculum: A conceptual design. Philadelphia: Research for Better Schools.

Presseisen, B. Z. (1985b). Unlearned lessons: Current and past reforms for school improvement. Philadelphia & London: Falmer Press, Taylor and Francis Group.

Purkey, S. C., & Degen, S. (1985). Beyond effective schools to good schools: Some first steps. R&D Perspectives. Eugene, OR: University of Oregon, Center for Educational Policy and Management.

Quellmalz, E. S. (1985). Needed: Better methods for testing higher-order thinking skills. Educational Leadership, 43(2), 29-35.

Ranbom, S. (1985). Schooling in Japan: The paradox in the pattern. Education Week, 4(22), 11-34.

Rapparlie, E. (1964). Election year: A time to teach critical thinking. The Grade Teacher, 82(2), 100-103.

Raths, L. E., Wassermann, S., Jonas, A., & Rothstein, A. M. (1967). Teaching for thinking: Theory and application. Columbus, OH: Charles E. Merrill.

Resnick, L. B. (1976). Introduction: Changing conceptions of intelligence. The nature of intelligence (pp. 1-10). New York: John Wiley.

Resnick, L. B. (1985). Education and learning to think. Pittsburgh, PA: Learning Research and Development Center (photocopy).

Russell, D. H. (1960). Higher mental processes. In C. W. Harris (Ed.), Encyclopedia of educational research (p. 651). New York: Macmillan.

Sadler, W. W., Jr., & Whimbey, A. (1985). A holistic approach to improving thinking skills. Phi Delta Kappan, 67(3), 199-203.

Scardamalia, M. (1984). Higher order abilities: Written communication. Paper presented for the American Educational Research Association Project: Research Contributions for Educational Improvement.

Schoenfeld, A. H. (1979). Can heuristics be taught? In J. Lochhead & J. Clement (Eds.), Cognitive process instruction: Research on teaching thinking skills (pp. 315-338). Philadelphia: The Franklin Institute Press.

Schoenfeld, A. H. (1980). Teaching problem-solving skills. The American Mathematical Monthly, 87, 794-805.

Schoenfeld, A. H. (1985). Psychology and mathematical method. Education and Urban Society, 17(4), 387-403.

Segal, J. W., Chipman, S. F., & Glaser, R. (1985). Thinking and learning skills (Volumes I and II). Hillsdale, NJ: Lawrence Erlbaum Associates.

Shipman, V. (1983). New Jersey test of reasoning skills. New Jersey: Totowa Board of Education.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2), 4-14.

Smith, B. O. (1953). The improvement of critical thinking. Progressive Education, 39(5), 129.

Stedman, L. C., & Kaestle, C. F. (1985). The test score decline is over: Now what? Phi Delta Kappan, 67(3), 204-210.

Sternberg, R. J. (1979). The nature of mental abilities. American Psychologist, 34(3), 214-230.

Sternberg, R. J. (1981). Intelligence as thinking and learning skills. Educational Leadership, 39(1), 18-20.

Sternberg, R. J. (1985). Critical thinking: Its nature, measurement, and improvement. In F. R. Link (Ed.), Essays on the intellect (pp. 45-65). Alexandria, VA: Association for Supervision and Curriculum Development.

Sternberg, R. J., & Baron, J. B. (1985). A statewide approach to measuring critical thinking skills. Educational Leadership, 43(2), 40-43.

Taba, H. (1964). Thinking in elementary school children (USOE Cooperative Research Project No. 1574). San Francisco: San Francisco State College.

Walsh, D. M., & Paul, R. W. (1985). Critical thinking: From educational ideal to educational reality. Washington, DC: American Federation of Teachers (photocopy).

Whimbey, A., & Whimbey, L. S. (1975). Intelligence can be taught. New York: E. P. Dutton.

Wilson, H. E. (1942). Developing skill in critical thinking through participation in school and community life. In H. R. Anderson (Ed.), Teaching critical thinking in the social studies (thirteenth yearbook) (pp. 93-124). Washington, DC: National Council for the Social Studies.

Winocur, S. L. (1982). Project IMPACT. Costa Mesa, CA: Orange County Department of Education.

Worsham, A. W., & Austin, G. R. (1983). Effects of teaching thinking skills on SAT scores. Educational Leadership, 41(3), 50-51.

APPENDIX A

List of Thinking Skill Meetings and Conferences
1984-1986

LIST OF THINKING SKILL MEETINGS AND CONFERENCES 1984-1986*

Title: Teaching Thinking Skills Invitational Conference

Date: May 17-19, 1984

Place: The Johnson Foundation, Wingspread, Racine, Wisconsin

Sponsor(s): Association for Supervision and Curriculum Development

Title: Conference on Thinking

Date: August 20-23, 1984

Place: Harvard University

Sponsor(s): Harvard Grad School of Education, University of Massachusetts-Amherst; University of the South Pacific

Title: Critical Thinking and Education

Date: October 26-27, 1984

Place: Buffalo, New York

Sponsor(s): Western New York Educational Service Council

Title: Intellectual Skills Development

Date: November 16-17, 1984

Place: Western Michigan University, Kalamazoo, MI

Sponsor(s): Division of Continuing Education, Western Michigan University

Title: Conference on Teaching Thinking

Date: March 11-13, 1985

Place: Wallingford, Connecticut

Sponsor(s): Connecticut State Department of Education

*A partial listing.

Title: Conference on Critical Thinking

Date: April 11-12, 1985

Place: Christopher Newport College, Newport News, Virginia

Sponsor(s): Christopher Newport College

Title: Critical Thinking and the Formation of Values (6th Nat'l Institute)

Date: May 16-19, 1985

Place: University of Chicago

Sponsor(s): University of Chicago, Office of Continuing Education

Title: Teaching Thinking Skills: Bridging the Gap Between Research and and Practice

Date: May 21, 1985

Place: University of Pittsburgh

Sponsor(s): Learning Research and Development Center, University of Pittsburgh; Allegheny Intermediate Unit, Pennsylvania Department of Education

Title: Thinking Skills Conference (1st annual)

Date: June 11-13, 1985

Place: Cincinnati, Ohio

Sponsor(s): Greater Cincinnati School Districts and Consortium of Colleges and Universities

Title: Teaching Thinking: A Working Conference

Date: June 17-19, 1985

Place: Chatham, Ontario Canada

Sponsor(s): St. Clair College

Title: Institute on Higher Order Intellectual Processes

Date: June 25-28, 1985

Place: University of Washington, Seattle, Washington

Sponsor(s): IDEA Institute, Dayton, Ohio

Title: Teaching for Thinking (summer program)

Date: July, 1985

Place: University of Massachusetts, Boston

Sponsor(s): Critical & Creative Thinking Program, U of MA

Title: Critical Thinking and Educational Reform (5th annual and 3rd Int'l conference)

Date: July 20-23, 1985

Place: Sonoma State University Rohnert Park, California

Sponsor(s): Center for Critical Thinking and Moral Critique

Title: Student as Thinker: Philosophy in the Classroom

Date: October 18-19, 1985

Place: Lehigh University Bethlehem, Pennsylvania

Sponsor(s): Bethlehem Area School District

Title: The State of Thinking

Date: October 28, 1985

Place: Westin Hotel - Detroit, Michigan

Sponsor(s): Michigan State Board of Education

Title: Maintaining the Quest for Excellence

Date: November 24-26, 1985

Place: Host Inn, Harrisburg, Pennsylvania

Sponsor(s): PA Association for Supervision & Curriculum Development

Title: Informal Logic and Critical Thinking

Date: December 27-30, 1985 March 27-29, 1986 April, 1986

Place: Washington Los Angeles St. Louis

Sponsor(s): Association for Informal Logic and Critical Thinking

Title: Teaching Thinking: The Cornerstone of Effective Education

Date: February 6-8, 1986

Place: Hilton Head Island, South Carolina

Sponsor(s): The Center for Reasoning Studies, Piedmont Technical College, Greenwood, South Carolina

Title: Assessment of Thinking Skills: Michigan School Testing Conference

Date: February 25-26, 1986

Place: University of Michigan, Ann Arbor

Sponsor(s): University of Michigan, Michigan State Board of Education, Michigan Association for Measurement and Evaluation in Guidance

Title: Thinking and Learning: Bridges to the Possible (annual conference)

Date: March 1-4, 1986

Place: San Francisco, California

Sponsor(s): Association for Supervision and Curriculum Development

Title: Reasoning and Higher Education

Date: March 14-15, 1986

Place: Boise, Idaho

Sponsor(s): The Center for the Study of Thinking, Boise State University

Title: Critical Thinking: Practical Applications

Date: March 19, 1986

Place: Stockton State College, New Jersey

Sponsor(s): New Jersey Department of Higher Education

Title: Thinking About Thinking

Date: May 14, 1986 (2nd Annual)

Place: University of Pittsburgh

Sponsor(s): Learning Research & Development Center, University of Pittsburgh, Pennsylvania

Title: The Development of Thinking and Reasoning from Adolescence Through Adulthood

Date: May 29-31, 1986

Place: Philadelphia, Pennsylvania

Sponsor(s): Jean Piaget Society

Title: Thinking Skills Conference (2nd annual)

Date: June 17-19, 1986

Place: Cincinnati, Ohio

Sponsor(s): Greater Cincinnati Area School Districts; Consortium of Colleges and Universities; Cincinnati Federation of Teachers

Title: Productive Thinking Skills

Date: July 13-19, 1986

Place: Hampshire College, Amherst, Massachusetts

Sponsor(s): Center for Productive Thinking, Carkhuff Institute of Human Technology

Title: Institute on Thinking: Critical and Creative

Date: July 28 - August 1, 1986

Place: Harvard University

Sponsor(s): Institute on Thinking - Harvard Graduate School of Education

Title: Monterey Bay Critical Thinking Conference

Date: July 29 - August 2, 1986

Place: University of California - Santa Cruz

Sponsor(s): Creative Education - SOI and Midwest Publications

Title: Critical Thinking and Educational Reform (6th annual; 4th Int'l)

Date: August 3-6, 1986

Place: Sonoma State University Rohnert Park, California

Sponsor(s): Center for Critical Thinking and Moral Critique

APPENDIX B

Organizations in ASCD's Collaborative on Teaching Thinking

Organizations in ASCD's Collaborative on Teaching Thinking

American Association of Colleges for Teacher Education
American Federation of Teachers
American Association of School Administrators
American Educational Research Association
Association for Supervision and Curriculum Development
Council of Great City Schools
Home Economics Education Association
Institute for Development of Educational Activities
International Listening Association
International Reading Association
Music Educators National Conference
National Art Education Association
National Association of Black School Educators
National Association of Elementary School Principals
National Council for the Social Studies
National Council of Teachers of English
National Council of Teachers of Mathematics
National Education Association
National School Boards Association
National Science Teachers Association
National Congress of Parents and Teachers
National Association of Secondary School Principals
National School Public Relations Association

For Further Information, contact:

Dr. Ronald Brandt
Executive Editor, ASCD
125 N. West Street
Alexandria, VA 22314